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Short-range magentic correlations and dynamic orbital ordering in the thermally activated spin state of $LaCoO_3$ S. ROSENKRANZ, Argonne National Laboratory, D. PHELAN, D. LOUCA, S.H. LEE, University of Virginia, P.J. CHUPAS, R. OSBORN, H. ZHENG, J.F. MITCHELL, Argonne National Laboratory — The cobalt perovskites $La_{1-x}Sr_xCoO_3$ show intriguing spin, lattice, and orbital properties similar to the ones observed in colossal magnetoresistive manganites. The x=0 parent compound is a non-magnetic insulator at low temperatures, but shows evidence of a spin-state transition of the cobalt ions above 50K from a low-spin to an intermediate or high-spin configuration. Using high resolution, inelastic neutron scattering, we observe a distinct low energy excitation at 0.6meV coincident with the thermally induced spin state transition observed in susceptibility measurements. The thermal activation of this excited spin state also leads to short-range, dynamic ferro- and antiferromagnetic correlations. These observations are consistent with the activation of a zero-field split intermediate spin state as well as the presence of dynamic orbital ordering of these excited states.

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